

Nader

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NDQ5 Series

Automatic Transfer Switch

Nader

Leading Low-voltage Electrical Component Manufacturer

NDQ5 Series

Automatic Transfer Switch

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NDQ5 Series Automatic Transfer Switch

Application

- > NDQ5 series automatic transfer switch (hereinafter "ATS"), is used in AC emergency power supply system with frequency of 50Hz and rated operational voltage of 400V. When one power supply fails, ATS can implement power changeover between normal power and standby power automatically to ensure reliable power supply.
- > ATS is suitable for important places where power- breaking is not allowable, such as hospital, mall, bank, hotel, high building, military and fire protection facilities. This product conforms to following standards and specifications: Part 6-1 "Automatic Transfer Switch" of GB/T14048.11-2002 (idt. IEC60947-6-1): Low Voltage Switchgear and Controlgear, Fire Protection Specification of Civil High Building and Five Protection Specifications for Architectural Design.

Model and Implication

ND	Q	5	-	□	□	□	/	□	□
1	2	3	4	5	6	7	8		
No.	Implication	NDQ5							
1	Brand code	ND Nader							
2	Product code	Q Automatic Transfer Switch							
3	Design code	5							
4	Frame size (A)	100, 250, 400, 800							
5	Control mode	Please refer to Table 1.							
6	Rated current	Please refer to Table 1.							
7	Number of poles	3, 4							
8	Controller type	B: Basic type D: Intelligent type							

Table 1: Model and Implication

Frame Size (A)	Rated Current (A)	Control Mode	Number of poles	Controller Type
100	16, 20, 25, 32, 40, 50, 63, 80, 100	R: Self-throwing -self-restoring S: Self-throwing -non-self-restoring F: Grid-generator	3P 4P	B: Basic type D: Intelligent type
250	125, 160, 180, 200, 225, 250			
400	315, 350, 400			
800	500, 630, 700, 800			

Product Features

- > Double protections of reliable mechanical interlock and electrical interlock based on Microchip single-chip microcomputer between two load switches to ensure switching reliably.
- > Fitted with overvoltage protection, undervoltage protection, phase failure protection, automatic switching and intelligent alarm function.
- > Parameters can be set freely from external LCD panel.
- > Small size, safe and reliable, convenience usage, low energy consumption.
- > Fitted with fire-proof control function, when sending fire controlling signal to the intelligent controller, two load switches are in "OFF" status.
- > Latest rotating two-breaker technology greatly improves rated breaking capacity, which can meet the utilisation requirements of AC-33B in latest standards.
- > Construction of products is made up of high quality cold rolled steel plate with beautiful and novel appearance, coating surface adopt advanced electrostatic powder coating technology with coat layer of good adhesion force and erosion resistance.

Working Condition

- > Temperature: -5°C~+40°C. The average temperature in 24 hours does not exceed +35°C.
- > Humidity: The relative humidity does not exceed 50% at the maximum temperature of 40°C. Higher relative humidity are permitted at the lower temperature, e.g: the humidity allow to be 90% under the temperature of 20 °C. Special measures may be required in case of occasional condensation due to the vibration of temperature.
- > Altitude: ≤2000m.
- > Pollution degree: 3 class.
- > Utilization type: AC-33B.
- > Electrical apparatus level: PC level.

Main Specifications

Type	NDQ5-100	NDQ5-250	NDQ5-400	NDQ5-800
Number of poles	3, 4	3, 4	3, 4	3, 4
Conventional thermal current (A) Ith 60°C	100	250	400	800
Rated insulation voltage (V) Ui AC 50Hz	750	750	750	750
Rated impulse withstand voltage (V) Uimp	8000	8000	8000	8000
Rated operational voltage (V) Ue AC 50Hz	400	400	400	400
Rated current (A) Ie	16, 20, 25, 32, 40, 50, 63, 80, 100	125, 160, 180, 200, 225, 250	315, 350, 400	500, 630, 700, 700, 800
Rated working hours	Around-the-clock working	Around-the-clock working	Around-the-clock working	Around-the-clock working
Rated short current making capacity (kA) Icm	8	17	17	32
Rated short-time withstand current (kA, rms) Icu	5	10	10	20Ie
Rated breaking capacity AC-33B	10Ie	10Ie	10Ie	10Ie
Endurance	Electrical	5000	5000	4000
	Mechanical @AC33B/400V	1500	1000	1000
Reliable contact indication	With	With	With	With
Min. switching time (s)	4	4	4	4

Functions of Controller

Controller type	B type	D type
Automatic working mode		
Monitoring undervoltage of normal power	√	√
Monitoring overvoltage of normal power	√	√
Monitoring phase failure of normal power	√	√
Monitoring undervoltage of standby power	√	√
Monitoring overvoltage of standby power	√	√
Monitoring phase failure of standby power	√	√
Generator controlling	√	√
Forced changeover working mode		
Forced changeover to normal power	√	√
Forced changeover to standby power	√	√
Forced changeover to both OFF position	√	√
Manual working mode		
Manual changeover to normal power	√	√
Manual changeover to standby power	√	√
Manual changeover to both OFF position	√	√
Display		
ON/OFF status of normal power & standby power	√	√
Phase voltage value of normal power & standby power	×	√
Content setting	×	√
Automatic, forced and manual working modes	√	√
Fire-fighting alarm signal	√	√
Passive fire-fighting alarm signal changeover to none power	√	√
Delay time and threshold		
Switching-off delay time (s)	×	0-60 ▲ 1
Switching-on delay time (s)	×	0-60 ▲ 1
Undervoltage (V)	176	132-176 ▲176
Overvoltage (V)	264	235-265 ★264

▲ : Original setting value. User can adjust the parameters according to demands on site.

★ : Default setting value. User should provide needed parameters when ordering.

Operating Procedure of Intelligent Controller

- > The intelligent controller keeps testing three-phase voltage of normal power and standby power, compares the detected results with the setting values, judges the voltage above overvoltage setting value as overvoltage, the voltage below undervoltage setting value as undervoltage. Once the voltage is judged as in fault condition, the intelligent controller will deliver OFF/ON command to motor mechanism by command relay based on pre-set delay program. At the same time, the indicators and LCD panel on faceplate display above said detected results.

Working Mode

- > The ATS has three working modes: manual working mode, automatic working mode and functions menu mode.
- > There are three working status of ATS: Normal power works-- break standby power, make normal power; Standby power works--break normal power, make standby power; Power cut--two load switches are both in OFF position.
- > Manual working mode: Operate handle manually to changeover within three status: "Normal power", "Power cut" and "Standby power".
- > Automatic working mode: The ATS can automatically changeover based on power condition. Under automatic working mode, the ATS can be divided into three versions by controlling function, self-throwing-self-restoring(R), self-throwing-non-self-restoring(S) and grid-generator(F). The first two versions are suitable for grid-to-grid power system, the last version is suitable for grid-to-generator power system. And under automatic working mode, pressing "1" button can force to changeover to normal power; Pressing "H" button can force to changeover to standby power; Pressing "OFF" button can force to changeover to power cut status.
- > Function menu mode: When press "MENU" button, function indicator lights and controller access to function menu mode. And some parameters can be set under such mode. After finishing one setting cycle, ATS will returns to automatic working mode.

Self-throwing-self-restoring Controller (R)

- > Intelligent controller monitors normal power and standby power, implement changeover automatically. When both two powers is in normal, power is supplied by normal power. When normal power is in abnormal (overvoltage, undervoltage, phase default), after the setting delay time t1, the normal power will be cut off. Then after setting delay time t2, the standby power works automatically. During this period, normal auxiliary terminal will be open and standby auxiliary terminal will be closed. When the normal power returns to normal condition, after the setting delay time t1, the standby power will be cut off. Then after setting delay time t2, the normal power turns back to work. When the normal power supplies power normally but standby power is in abnormal condition, the indicator of standby power on controlling faceplate will indicates according to fault type and send out alarming contact signal. The functions of self-throwing-self-restoring controller are shown in Table 2.

Table 2: Function of self-throwing-self-restoring controller

Normal Power	Standby Power	Controlling Functions
Normal	Normal	Power from normal power: Normal power is ON, standby power is OFF.
Normal	Abnormal	Power from normal power: Normal power is ON, standby power is OFF. Alarm signal is sent out.
Abnormal	Normal	Normal power is OFF after delay time t1, then standby power is ON after delay time t2. Power is from standby power.
Returns to normal	Normal	Standby power is OFF after delay time t1, then normal power is ON after delay time t2. Power is from normal power again.
Abnormal	Abnormal	ATS remains status before faults.

> Note:

t1: switching-off delay, 0-60s adjustable, setting value at factory is 1s (The same applies to Table 3 and Table 4)

t2 : switching-on delay, 0-60s adjustable, setting value at factory is 1s (The same applies to Table 3 and Table 4)

Self-throwing-non-self-restoring Controller (S)

- > Intelligent controller monitors normal power and standby power, implement changeover automatically. When normal power is in abnormal, it will be cut off after setting delay time t1. Then the standby power works automatically after delay time t2. When the normal power returns to normal condition, the power is still supplied by standby power until the standby power is in abnormal condition. In such condition, the standby power will be cut off after setting delay time t1, then the normal power works automatically after delay time t2. The functions of self-throwing-non-self controller are shown in Table 3.



Table 3: Function of self-throwing-non-self-restoring controller

Normal Power	Standby Power	Controlling Functions
Normal	Normal	Power from normal power: Normal power is ON, standby power is OFF.
Abnormal	Normal	Normal power is OFF after delay time t1, then standby power is ON after delay time t2. Power is from standby power.
Returns to normal	Normal	Power is still from standby power.
Normal	Abnormal	Standby power is OFF after delay time t1, then normal power is ON after delay time t2. Power is from normal power again.
Abnormal	Abnormal	ATS remains status before faults.

Grid-generator Controller (F)

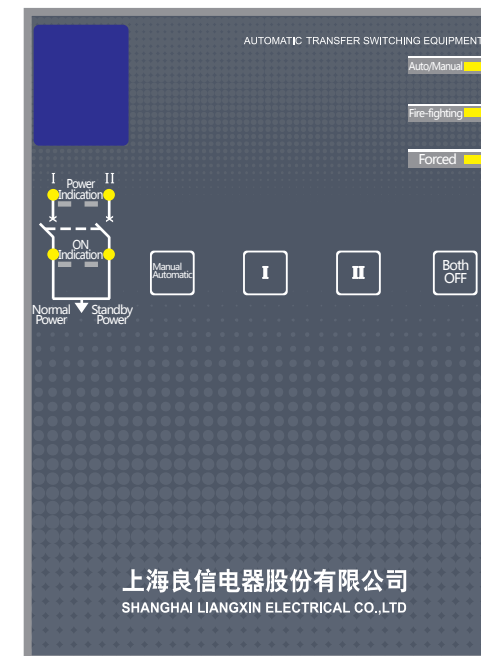
> Intelligent controller monitors normal power and standby power, implement switching automatically. When the normal power is in abnormal condition, "Power generation" command will be sent out after delay time. When the voltage of self-contained generator is up to 85% of rated voltage Ue, the normal power will be out off. Meanwhile, "Unloading" command will be sent out to unload the minor loads. Power will turn to be supplied by generator automatically after proper delay time. After the normal power returns to normal, the generator power will be cut off. Power returns to be supplied by the normal power. And command signal will be sent out to stop the generator. The functions of grid-generator controller are shown in Table 4.

Table 4: Function of grid-generator controller

Normal Power	Standby Power	Controlling Functions
Normal	Non-generating	Power from normal power: Normal power is ON, standby power is OFF.
Abnormal	Generating	"Power generation" command will be sent out after delay time to request generating.
Abnormal	Normal	Normal power is OFF after delay time t1. Meanwhile, "Unloading" command will be sent out to unload the minor loads. Then standby power is ON after delay time t2. Power is from generator.
Returns to normal	Non-generating	Power from normal power. Switching-on indicator of normal power lights. After delay time t3, "Power generation/Unloading" command will be cancelled.
Abnormal	Abnormal	ATS remains status before faults.

> Note:
t3: Cooling machine delay time is 30s. (Non-adjustable)

Illustration on B Type Controller Panel



Indicator

- > Indicator for normal power (Red light)
 - Lighting solid: Normal power works normally; Going out: Fault on normal power (phase failure, overvoltage, undervoltage)
- > Indicator for standby power (Red light)
 - Lighting solid: Standby power works normally; Going out: Fault on standby power (phase failure, overvoltage, undervoltage)
- > ON indicator for normal power (Green light)
 - Lighting solid: Switching-on of normal power. Going out: Switching-off of normal power.
- > ON indicator for standby power (Green light)
 - Lighting solid: Switching-on of standby power. Going out: Switching-off of standby power.
- > Auto/Manual indicator (Green light)
 - Lighting solid: Automatic working mode. Going out: Manual working mode.
- > Fire-fighting indicator (Red light)
 - Lighting solid: Control system received fire-fighting alarm signal. Going out: No fire-fighting alarm signal.
- > Forced changeover indicator (Yellow light)
 - Lighting solid: Control system is under forced changeover status. Going out: Control system is not under forced changeover status.

Button and Display





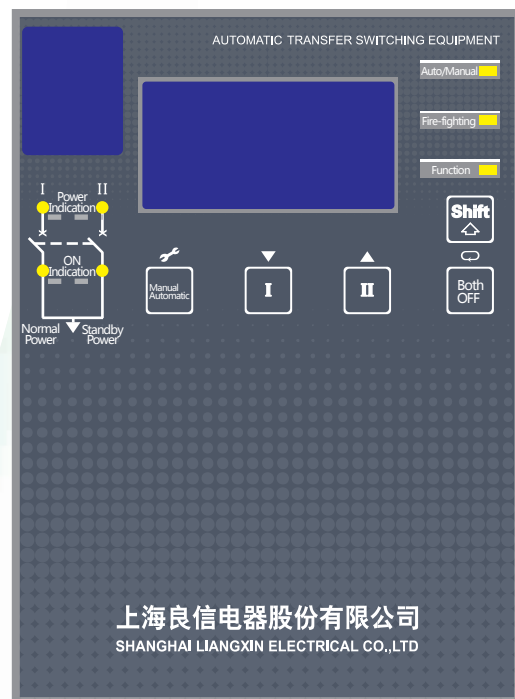
- > "Auto/Manual" Button 
 - When the product is energized at the beginning, control system accesses into automatic working mode. "Auto/Manual" indicator lights solid; Press this button, control system is changed over to manual working mode. "Auto/Manual" indicator goes out. Then ATS can be manually transferred to other working position (normal power, both OFF, standby power) by operating handle.
- > "Normal Power" Button 
 - This button is only valid under automatic working mode. Press this button, ATS will access into forced changeover working mode. In such situation, when ATS is in normal power working status, ATS will not change over and forced changeover indicator turns to light solid from dark; When ATS is in standby power working status, ATS will change over to normal power working status and forced changeover indicator turns to light solid from dark. At this time, ATS only can turn to automatic working mode by pressing "Auto/Manual" button and forced changeover indicator will go out.
- > "Standby Power" Button 
 - This button is only valid under automatic working mode. Press this button, ATS will access into forced changeover working mode. In such situation, when ATS is in standby power working status, ATS will not change over and forced changeover indicator turns to light solid from dark; When ATS is in normal power working status, ATS will change over to standby power working status and forced changeover indicator turns to light solid from dark. At this time, ATS only can turn to automatic working mode by pressing "Auto/Manual" button and forced changeover indicator will go out.
- > "Both OFF" Button 
 - This button is only valid under automatic working mode. Press this button, ATS will access into forced changeover working mode. In such situation, when ATS is in normal power working status, ATS will change over to both OFF position and forced changeover indicator turns to light solid from dark; When ATS is in standby power working status, ATS will change over to both OFF working position and forced changeover indicator turns to light solid from dark. At this time, ATS only can turn to automatic working mode by pressing "Auto/Manual" button and forced changeover indicator will go out.

Illustration on D Type Controller Panel



Indicator

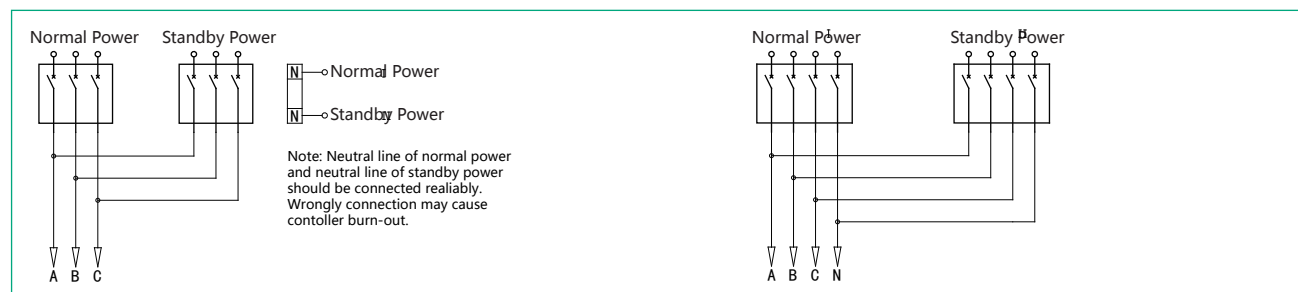
- > Indicator for normal power (Red light)
 - Lighting solid: normal power works normally. Going out: Fault on normal power (phase failure, overvoltage, undervoltage)
- > Indicator for standby power (Red light)
 - Lighting solid: standby power works normally. Going out: Fault on standby power (phase failure, overvoltage, undervoltage)
- > ON indicator for normal power (Green light)
 - Lighting solid: Switching-on of normal power. Going out: Switching-off of normal power.
- > ON indicator for standby power (Green light)
 - Lighting solid: Switching-on of standby power. Going out: Switching-off of standby power.
- > Auto/Manual indicator (Green light)
 - Lighting solid: Automatic working mode. Going out: Manual working mode.
- > Fire-fighting indicator (Red light)
 - Lighting solid: Control system received fire-fighting alarm signal. Going out: No fire-fighting alarm signal.
- > Function indicator (Yellow light)
 - Lighting solid: Control system enters to function menu mode. Going out: Control system is not under function menu mode.

Button and Display

- > Combination Button of "Auto/Manual" and Function Sign
 - When it is energized at the beginning, control system accesses into automatic working mode. "Auto/Manual" indicator lights solid and LCD display shows "Automatic"; Press this combination button, control system is changed over to manual working mode. "Auto/Manual" indicator goes out and LCD display shows " "; Then ATS can be manually transferred to other working position (normal power, both OFF, standby power) by operating handle.
- > Combination Button of "Normal Power" and Downward Sign
 - This button is only valid under automatic working mode. Press this button, ATS will access into forced changeover working mode. In such situation, when ATS is in normal power working status, ATS will not change over and LCD display shows "Forced" "Normal Power"; When ATS is in standby power working status, ATS will change over to normal power working status and LCD display shows "Forced" "Normal Power". At this time, ATS only can turn to automatic working mode by pressing "Auto/Manual" button.
- > Combination Button of "Standby Power" and Upward Sign
 - This button is only valid under automatic working mode. Press this button, ATS will access into forced changeover working mode. In such situation, when ATS is in standby power working status, ATS will not change over and LCD display shows "Forced" "Standby Power"; When ATS is in normal power working status, ATS will change over to standby power working status and LCD display shows "Forced" "Standby Power". At this time, ATS only can turn to automatic working mode by pressing "Auto/Manual" button.
- > Combination Button of "Both OFF" and Confirmation Sign
 - This button is only valid under automatic working mode. Press this button, ATS will access into forced changeover working mode. In such situation, when ATS is in normal power working status, ATS will change over to both OFF position and LCD display shows "Forced" "Switching-off"; When ATS is in standby power working status, ATS will change over to both OFF position and LCD display shows "Forced" "Switching-off". At this time, ATS only can turn to automatic working mode by pressing "Auto/Manual" button.
- > Button of Shift Up Function
 - This button is only valid under automatic working mode. Press this button, ATS will access into function menu mode and function indicator lights solid. During this period, four upshifted signs are valid. Within them, button with function sign is for accessing function menu and turning to another page; Buttons with upward sign and downward sign are for parameters setting; Button with confirmation sign is for confirming the parameter value. After finishing one setting cycle, controller system will return to automatic working mode. When entering the menu for the first time, LCD display mainly shows "Set", "Undervoltage", "Setting Value" and "XXX V".

Electrical Diagrams

Electrical Diagram for Main Circuit



Electrical diagram for 3-pole product

Electrical diagram for 4-pole product

Electrical Diagram for Secondary Circuit



Functions Table for Auxiliary Terminals

Controller Type	Terminal No.	1, 2	3, 4	5, 6	7, 8
Self-throwing-self-restoring Type(R)	Self-throwing-non-self-restoring Type(S)	Fire control	Alarm signal	Standby auxiliary	Normal auxiliary
Grid-generator Type (F)		Fire control	Power generation/ Unloading command	Standby auxiliary	Normal auxiliary

- Notes: 1. 3-4, 5-6, 7-8 three group output nodes are normal close output when ATS is not energized.
 2. For any group nodes, if signal status is real, output nodes are normal closed; If signal status is false, output nodes are normal open.

Dimension

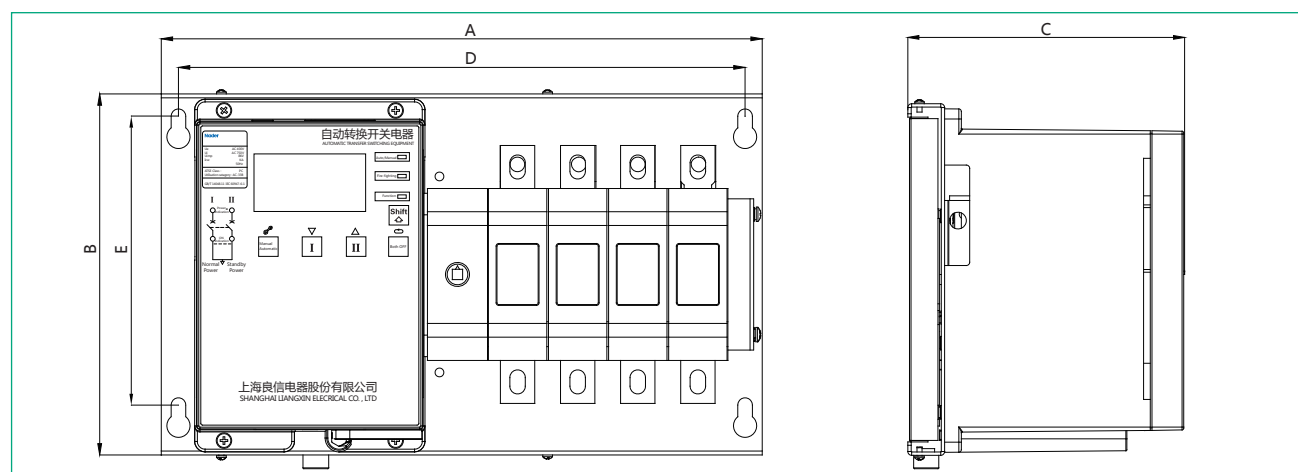


Diagram 1. Dimensions for integrated type

Table 5: Dimensions

Type	Outline Dimensions					Installation Dimensions
	A	B	C	D	E	Installation Screw Hole
NDQ5-100	320	210	148	300	168	Φ8
NDQ5-250	350	210	176.5	330	168	Φ8
NDQ5-400	420	210	217	395	168	Φ8
NDQ5-800	540	210	278	495	168	Φ8

Ordering Notice

> Any special requirement, please consult with manufacturer and declare in order.
We repair or replace faulty product due to quality issue up to 3 years from manufacture date.

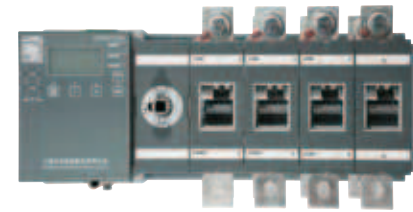
Please specify the following information when placing an order:

- 1) Frame size
- 2) Control mode
- 3) Rated current
- 4) Number of poles
- 5) Controller type
- 6) Quantity

Following Order Form can also be used when ordering.

Order Form	
Product code	NDQ5
Frame size (A)	<input type="checkbox"/> 100 <input type="checkbox"/> 250 <input type="checkbox"/> 400 <input type="checkbox"/> 800
Control mode	<input type="checkbox"/> R—Self-throwing-self-restoring <input type="checkbox"/> S—Self-throwing-non-self-restoring <input type="checkbox"/> F—Grid-generator
Rated current (A)	100 <input type="checkbox"/> 16 <input type="checkbox"/> 20 <input type="checkbox"/> 25 <input type="checkbox"/> 32 <input type="checkbox"/> 40 <input type="checkbox"/> 50 <input type="checkbox"/> 63 <input type="checkbox"/> 80 <input type="checkbox"/> 100 250 <input type="checkbox"/> 125 <input type="checkbox"/> 160 <input type="checkbox"/> 180 <input type="checkbox"/> 200 <input type="checkbox"/> 225 <input type="checkbox"/> 250 400 <input type="checkbox"/> 315 <input type="checkbox"/> 350 <input type="checkbox"/> 400 800 <input type="checkbox"/> 500 <input type="checkbox"/> 630 <input type="checkbox"/> 700 <input type="checkbox"/> 800
Number of poles	<input type="checkbox"/> 3 <input type="checkbox"/> 4
Controller type	<input type="checkbox"/> B—Basic type <input type="checkbox"/> D—Intelligent type Overvoltage setting range: 235V~265V Default value: 264V Customer required value: _____V
Quantity	
Purchaser (Signature or stamp)	
Contact person	Tel. No.
Fax. No.	

Application Illustration



NDQ5-800R 800/4D



NDQ5-400R 400/4D



NDQ5-250R 250/4D



NDQ5-100R 100/4D

